METHODS AND DEVICES FOR CONTROLLING THE REACTION RATE AND/OR REACTIVITY OF HYDROCARBON TO AN INTERMEDIATE OXIDATION PRODUCT BY ADJUSTING THE OXIDANT CONSUMPTION RATE

ABSTRACT OF THE DISCLOSURE

Methods and devices for controlling the reaction rate and/or reactivity of a hydrocarbon to an intermediate oxidation product, such as an acid, within predetermined limits, are disclosed. Control of the reaction rate and/or reactivity within predetermined limits is achieved by monitoring and controlling the oxidant consumption rate. According to the present invention, examples of ways to determine the oxidant consumption rate include, but are not limited to, monitoring the flow rates of incoming and outgoing oxidant, monitoring pressure differentials after temporarily ceasing entry and exit of gases, and monitoring the flow rates of incoming and outgoing gases, and monitoring the rates of incoming and outgoing hydrocarbon. The methods and devices of the present invention are particularly advantageous in the case that the hydrocarbon is cyclohexane, the intermediate oxidation product is adipic acid, the solvent is acetic acid, the catalyst is cobalt (II) acetate tetrahydrate, and the initiator or promoter is cyclohexane, or acetaldehyde, or a mixture of thereof.